CLAIMS

1. Apparatus for effecting a search through a database of music files, comprising:

input means, for providing as input search criteria comprising a tune as a sequence of melodic intervals;

comparing means, for comparing said sequence of melodic intervals with selected portions of a plurality of computer-readable music files; and

output means, for providing as output a list of possible matches of said search criteria with ones of said plurality of computer-readable music files.

2. Apparatus according to claim 1 wherein said input means comprises a microphone into which a user can sing, hum or whistle said tune.

3. Apparatus according to claim 1 wherein said input means comprises a MIDI keyboard for playing the tune.

4. Apparatus according to claim 1, claim 2 or claim 3 wherein the input means further includes pitch recognition means for identifying each melodic interval between a succession of musical pitches input as said tune.

5. Apparatus according to any one of claims 1 to 4 wherein said input means further includes quantization means for determining a closest chromatic interval, a closest whole tone interval, or a closest minor or major third interval between two successive musical pitches.

6. Apparatus according to any one of claims 1 to 4 wherein said input means further includes quantization means for determining a closest major, minor or other scale to which successive musical pitches will fit.

7. Apparatus according to any preceding claim further including means for determining, from said input sequence of melodic intervals, a succession of

rhythmic intervals and using said succession of rhythmic intervals as further search criteria.

8. Apparatus according to any preceding claim further including means for providing as input further search criteria comprising text information.

9. Apparatus according to any preceding claim wherein said comparing means includes means for comparing one or more segments of said tune with said selected portions of said plurality of computer-readable music files, and wherein said output means bases the likelihood of a match based on the number of separate segments and/or selected portions for which a possible match is indicated.

10. Apparatus according to claim 9 wherein said segments of the search tune and/or said selected portions of the music file are defined as overlapping note sequences.

11. Apparatus according to any preceding claim wherein said comparing means includes:

means for representing a) the input sequence of melodic intervals, and b) the selected portions of said plurality of computer-readable music files, each as a function of pitch against time, and

means for measuring a closeness of fit of said representations a) and b) to determine a degree of matching of the input sequence and each one of the selected portions.

12. Apparatus according to claim 11 further including transformation means for applying at least one transformation function to at least one of the functions a) and b) prior to measuring a closeness of fit.

13. Apparatus according to claim 12 wherein said at least one transformation function comprises any one of: a translation in pitch; a translation in time; a scaling in time; a variable scaling in time over different parts of the graph; a variable pitch

translation over different parts of the graph; and a transformation by removal of selected sections from the graph.

14. Apparatus according to claim 11 wherein said means for measuring closeness of fit comprises means for determining an error score for an *i*-note input sequence compared against an *n*-note selected portion of said music file for each of a plurality of values of *n*.

15. Apparatus according to claim 14 further including means for determining a value of *n* for which the error score is minimized.

16. Apparatus according to claim 15 further including means for varying *n* about a start value until an error score minimum is attained.

17. Apparatus according to any preceding claim wherein said comparing means includes means to identify relevant selected portions of a plurality of computer-readable music files by applying selection criteria to identify portions of the files likely to contain tunes.

18. Apparatus according to claim 17 wherein said relevant selected portions of said music files are stored in an index.

19. Apparatus according to claim 18 wherein said relevant selected portions stored in said index are encoded as text, said input means further including means for encoding said sequence of melodic intervals as a text string, said comparing means comprising a text search engine.

20. Apparatus according to claim 17 wherein the location, in said computer-readable music files, of said relevant selected portions of said music files are indicated by one or more tags, said comparing means adapted to locate said tags.

21. Apparatus for indexing a music database comprising:

means for identifying relevant selected portions of a plurality of computer-readable music files by applying selection criteria to identify portions of the files likely to contain tunes; and

means for tagging said music files to identify positions corresponding to said relevant selected portions.

22. Apparatus for indexing a music database comprising:

means for identifying relevant selected portions of a plurality of computer-readable music files by applying selection criteria to identify portions of the files likely to contain tunes; and

means for generating an index of said music files containing information representative of said relevant selected portions.

23. A method for effecting a search through a database of music files, comprising:

providing as input search criteria comprising a tune as a sequence of melodic intervals;

comparing said sequence of melodic intervals with selected portions of a plurality of computer-readable music files; and

providing as output a list of possible matches of said search criteria with ones of said plurality of computer-readable music files.

24. A computer program product, comprising a computer readable medium having thereon computer program code means adapted, when said program is loaded onto a computer, to make the computer execute the procedure of claim 23.

25. Apparatus for determining a sequence of melodic intervals from an input source comprising:

input means for providing an input signal waveform representing a tune;

note discretization means comprising means for dividing a frequency-time representation of said input signal waveform into discrete time periods to form a succession of input tune elements and, for each input tune element, determining a single gradient of the input over said time period.

26. Apparatus according to claim 25 further including:

means for designating the gradient of each element as one of the categories: horizontal / near-horizontal; diagonal; and vertical / near-vertical; and

means for coalescing adjacent elements of the same category to form compound elements.

27. Apparatus according to claim 26 further including means for eliminating said diagonal elements by redesignating each diagonal element or part of each diagonal element as a horizontal element having a value equal to a nearest adjacent horizontal element.

28. Apparatus according to claim 1 wherein said comparing means includes means for comparing a plurality of segments of said tune with a plurality of segments from said plurality of computer-readable music files, means for determining a number of matches of each segment-type, and wherein said output means bases the likelihood of a match based on a comparison of the profile of the number of each segment-type for said tune and for said music files.

29. Apparatus according to claim 11 in which the means for measuring a degree of matching includes means for determining a number of transformation functions required in order to match the representations a) and b).

30. Apparatus according to claim 1 wherein said computer-readable music files and/or said input search criteria comprise audio files.

31. Apparatus according to claim 30 wherein said comparing means further includes means to identify relevant selected portions of said audio files likely to contain tunes by detecting a component of the audio signal which is common to both left and right channels of a stereo pair of channels.

32. Apparatus substantially as described herein with reference to the accompanying drawings.

33. A method substantially as described herein with reference to the accompanying drawings.